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*Spelling Abilities  
of University  
Students in  
Developmental  
Writing Classes*

*Forty-four students at a mid-sized urban university were given a pseudo-word spelling test to explore the relationship between their spelling ability and their placement in college writing courses. Half the students required a developmental writing course and half took college-level classes. Number of correct (i.e., orthographically possible) spellings and types of spelling errors were recorded. Students in developmental classes misspelled considerably more words, and made more errors per word, than the students in college-level classes. In particular, developmental students made more substitution errors, using an inappropriate letter to represent a sound, especially misrepresenting vowels. These results are similar to findings reported for younger students with learning disabilities, raising the possibility that some developmental college-age students may have language learning disabilities that are undiagnosed and untreated.*

Many students who lack prerequisite writing skills for success in college are being placed in developmental classes, which they must pass before moving on to required college-level instruction in writing. Students in many developmental writing courses, as evidenced by the textbooks available, may receive instruction at the metacognitive level in brainstorming ideas, outlining, and paragraph development. Sentence structure, punctuation, and standard usage are typically also addressed. Still, at least in this author's experience, large numbers of students in developmental classes fail the course in a given semester.

For example, a recent examination of three consecutive semesters at a typical fourth tier, mid-sized state university, the site of the study

reported here, revealed that only 53% of developmental students passed the course the first time, while 30% failed and 15% withdrew before the end of the semester. Some students took the developmental class two, three, or even four times before either passing it or (more typically) withdrawing completely from the university. The same analysis of three semesters showed that only about 12% of students who failed re-enrolled within two semesters; of these, 57% failed the course again, and 21% withdrew. Students who initially withdrew did not fare better. Less than 7% of these re-enrolled within two semesters, but 75% of them failed and 25% withdrew again.

In nearly thirty years of teaching experience at two different universities, the author has experience with hundreds of students in the developmental writing course. Failure occurs for various reasons. Some students fail for non-attendance; some attend sporadically but do not complete assignments. Of greater concern are those students who actually attend, do assignments, and even succeed in mastering patterns of organization and development, yet persistently produce sentence fragments, run-ons, usage errors, mechanical mistakes, and poor word choices, indicating that attempts at bringing them up to college-level standards have failed.

### *The Place of Spelling in Writing Courses*

The poorest students often make an extraordinary number of errors which may seem to be trivial lapses in attention: words left out, homophones confused (*their/there*), apostrophes missing, and sentences which simply make no sense. Of particular note are an abundance of misspellings. Instructors may implore students to proofread more carefully, and students may protest that they already do. They may miss their errors because, instead of reading carefully what they have written, students rely on their memory of what they intended. They believe they are reading, but they see what they were planning to say rather than what they wrote. There is thus an apparent disconnection between the lexical representation of the words and what was actually written.

Most developmental writing classes are not designed to remediate this disconnection, which is especially apparent in students' poor spellings. Thought to be a relatively trivial problem, misspelling may be pointed out, even penalized by the instructor, but it is not cured. The student is told to stop misspelling, but is not told how. In general, not much attention has been paid to spelling skills beyond the primary-school level. After an initial emphasis on the memorization of spelling lists and, in some schools, on the orthographic principles peculiar to English (such as "i before e, except after c...."), pupils are then expected to spell

correctly in their written work. Typically, however, the young writer is given very little further guidance, and it is rare for remediation of spelling problems to be much of a priority.

In large part, this relegation of spelling to the back porch of language instruction has been due to a failure to appreciate the cognitive complexity of the spelling task. Kamhi and Hinton (2000) enumerated the reasons that spelling has not received proper respect. These include the linguists' emphasis on the primacy of the spoken word, the tendency to view spelling as a clerical rather than a linguistic issue, and the belief that spelling is fundamentally a visual process. More recently, however, researchers have come to understand the similarities between skills underlying spelling and those underlying reading. Given the close relationship between reading and writing, one must naturally wonder whether poor spelling skills are also symptomatic of fundamental problems that impair writing ability.

#### *Literacy Sub-Skills*

Among the important sub-skills in the acquisition of literacy are those considered phonological and those considered orthographic, and successful literacy requires the integration of these skills. Consider the reading of an unfamiliar word, that is, a written word for which there is no ready visual representation. Decoding requires the reader to map the sequence of orthographic graphemes onto a sequence of sounds, then, using relevant morphological, orthographic, and phonological rules, arrive at a phonemic representation. This must then be matched with an existing lexical item in the lexicon, which is a person's stored mental dictionary of words and morphemes, containing information about grammatical and semantic characteristics, pronunciation, and, in literate persons, spelling. To write an unfamiliar (non-visually represented) word, the reverse process must occur, whereby the phonemic string is segmented into discrete units, mapped onto graphemic equivalents, and relevant orthographic conventions invoked. A misspelling occurs when either the orthographic principles are not followed, producing a phonetically correct but unconventional attempt (e.g., *masheen* for "machine"), or the phonological representations are not fully developed. The latter may produce a misspelling which contains transpositions (e.g., *perfer* for "prefer"), deletions (*proibly* or *proolly* for "probably"), substitutions (*congradulate* for "congratulate"), or perhaps even additions to the phonological representation (*athelete* for "athlete"). Lexical or morphological confusion may also result in spelling errors, as when "their" is spelled *there* or "could've" is rendered *could of*.

Because of the overlap in sub-skills required for reading and spelling,

according to Ehri (2000), the correlation between the two skills is often high and spelling disability typically is co-morbid with reading disability. Conversely, training in phonological skills which leads to improved decoding can increase reading rates, which are in turn a good predictor of reading comprehension (Kitz & Nash, 1992). Patterns of spelling errors may indicate different levels of literacy or provide clues to different types of problems underlying poor literacy, including deficits causing reading disabilities. Adherence to principles of conventional orthography indicates a more sophisticated level of spelling development (Treiman & Bourassa, 2000), and an occasional error is by no means indicative of a problem. This is the level expected of students entering college. An increase in phonetically correct but nonconventional spellings, including homophone confusions such as *there* for "they're", is representative of many younger (or less well-educated) spellers, of some dyslexics whose primary deficit is in visual processing of written words, and of remediated dyslexics. It does not typically indicate a disorder of the underlying phonological system, however.

### *Reading Disability and Spelling*

On the other hand, non-phonetic spellings must raise the alarm that something more troubling is at work. Research has demonstrated that some language learning disabilities manifest themselves in poor spelling skills, and, conversely, that spelling instruction is an important component in the treatment of reading disabilities in particular (Kitz & Nash, 1992). While reading disabilities are usually termed "dyslexia," this term does not refer to a unitary syndrome. Developmental dyslexia actually consists of three or more syndromes involving disorders of the different sub-systems in reading, specifically the language system, the system which coordinates articulation and grapho-motor responses, and the visual-perceptual system (Mattis, French, & Rapin, 1975). Boder (1973) categorized dyslexic children as dysphonetic, dyseidetic, or mixed dysphonetic-dyseidetic. The first type, dysphonetic, is characterized by difficulty decoding letter-sound correspondences, and it is this type which may be indicated by non-phonetic spellings.

Thus, spelling relies on cognitive mechanisms similar to those required for reading, and spelling problems often indicate that crucial literacy-related skills are below par. Richardson (1984, p. 97) noted that in Boder's sample, some 85% of the dyslexic children (63% of whom were dysphonetic and 22% mixed dysphonetic-dyseidetic) experienced "phoneme-grapheme processing" difficulties. Both dyslexic adults and those with other reading disabilities often have concomitant deficits in phonological and morphological awareness, knowledge that underlies

decoding skills (cf. Kitz & Nash, 1992; Pennington, Van Orden, Smith, Green, & Haith, 1990; Trachtenberg, 2002).

Yet even adults without diagnosed reading disabilities, but who report reading difficulties, often lack the morphological and phonological analysis skills required of good spellers (Elbro, et al., 1994; Worthy & Viise, 1996). College students placed in low-level reading and study skills classes were found in Dietrich (1994) to exhibit poor word attack and phonological processing skills, among other problems. Ehri (2000) found that even students without reading comprehension problems, but who were poor spellers, nevertheless read more slowly and relied more heavily on contextual cues, suggesting that they may have more difficulty keeping pace with reading assignments in college-level courses, and proofreading their own (and others') work.

Because spelling should be well developed by the end of the secondary school years, persistent poor spelling may therefore point to underlying unremediated reading problems. It may also, given that reading and writing utilize most of the same processes, indicate more general problems with written language. If writing problems result from either delays in development of phonological processing skills or deficits underlying disabilities, then spelling may be an efficient tool for identification of adult students who may not have diagnosed reading disorders, but are at risk for failure in course work relying heavily on literacy. Dietrich (1994, p. 12) noted that, according to Lindamood and Lindamood, 30% of all normal populations have moderate to severe phonological awareness problems, but 90% percent of the 21 subjects tested in her reading and study skills class had such problems.

This research was designed to answer, in part, the following questions: What is the relationship between spelling ability and college writing skills? Do college-level students, in general, exhibit, as expected, well-developed spelling abilities? Do students who are assigned to developmental writing classes exhibit spelling and/or spelling patterns that differ from those students who are not?

## Method

To explore the relationship between college-level spelling ability and writing skills, performance on a nonsense-word spelling test was compared for students who were required to take developmental English and those who were not. Nonsense words were used to elicit spelling skills because they force students to utilize phonological processing skills, then map these onto orthographic knowledge, rather than relying on visual memory to spell the items. Words were phonologically complex, single-syllable forms consisting of consonant cluster + vowel + conso-

nant cluster (e.g. [spukst]; see Appendix 1). These were taken from an instrument developed by Swanson (1996), who utilized pseudo-word tests to assess spelling ability in older elementary school students with reading delays. Lists of "nonsense words" have also been used to assess decoding skills underlying reading in those who are dyslexic and non-reading disabled (Richardson, DiBenedetto, & Adler, 1982; Richardson, 1984).

#### *Participants*

Participants were 44 native English-speaking students at a mid-sized urban university in the Midwest region of the U.S. Half the students (the "developmental" or D group) were placed in developmental English classes based on either ACT English scores lower than 19 or failure to pass the university's placement examination, a test of essay writing, punctuation, and usage. At least three students in this group were attempting the class for the second time. The other 22 students (the "control" or C group) were recruited from those enrolled in introductory classes in linguistics who had reported successfully completing the college-level composition requirements without having to take the developmental course.

Groups were not matched for gender and ethnicity. The D group consisted of 44% women and 66% men, with 40% African American, 44% White, 12% Asian and 4% Hispanic students. The C group contained 82% women, with 5% African American, 91% White, and 4% Asian students. The skewed number of females in the C group may be attributed to the fact that most of the group were students majoring in education, a field that attracts more women than men. In contrast, the D group was not dominated by any particular academic major.

#### *Procedures*

To administer the test, the same instructor pronounced each item carefully, without repetition, from a phonetically rendered list of 20. Students were asked to spell each item "as if it were an English word." Tests were scored by the same instructor who administered the test. In scoring the test, the instructor determined (a) whether the written response was a possible English spelling of the word, and, if not, (b) what type and number of errors the student made.

#### *Data analysis*

There were five error types identified. Deletion (DEL) occurred when a subject had no grapheme to represent one of the sounds in the word (e.g., *spookt* for [spukst]). Insertion (INS) meant a subject added a grapheme

that did not correspond to a sound (e.g., *sprookst*). In a transposition (TRANS), the order of graphemes was reversed relative to the order of sounds (*spookts*). Substitution errors (SUB) were made when a grapheme was used which could not represent the sound, but represented a different sound (*spooksk*). Spelling errors (SPEL) also occurred, where the subject had a one-to-one correspondence between a sound and an appropriate grapheme, but failed to utilize an orthographic rule. For example, a subject spelling the form [splogz] as *sploges* probably decoded the word correctly, and correctly matched each sound with a letter, but forgot that *g* followed by *e* represents the palatal affricate or so-called "soft 'g'" rather than the velar stop or "hard 'g'." Occasionally, a subject gave no response, or wrote something that corresponded in no way to the phonetic form, such as with a perseverative response from a previous item. These were scored as "whole word errors."

## Results

The two groups exhibited large and significant differences in their performance in a number of respects (see Table 1). Of 440 responses, the number of correctly spelled pseudo-words was 118 for the D group and 260 for the C group ( $\chi^2 = 138.64$ ,  $p < .005$ ), with a mean of 5.36 and 11.82, respectively, for the 20-word list. Ranges were similar in size (D 1-14; C 4-17). The groups differed only slightly in the number of single errors per word subjects made. The D group made single errors in 156 words ( $\bar{x} = 7.09$ , range 0-11) and the C group made 150 single errors ( $\bar{x} = 6.82$ , range 3-10). However, large differences appeared when the number of words containing multiple errors was compared. The D group produced 154 misspellings containing two or more errors ( $\bar{x} = 7.00$ , range 0-17), while the C group had only 32 multiple-error misspellings ( $\bar{x} = 1.45$ , range 0-7). These differences in the number of words with multiple errors were statistically significant ( $\chi^2 = 92.11$ ,  $p < .01$ ). The D group also had over three times the number of whole word errors (D = 7,  $\bar{x} = .30$ , range 0-4; C = 2, range 0-2,  $\bar{x} = .09$ ), a somewhat less significant difference ( $\chi^2 = 2.78$ ,  $p < .10$ ).

The subjects also differed in the types of errors they made (see Table 2). The dominant error type for the D group was substitution ( $n = 206$ ,  $\bar{x} = 9.36$ , range 1-13), followed by deletion ( $n = 114$ ,  $\bar{x} = 5.18$ , range 1-12). The dominant error type for C was deletion ( $n = 66$ ,  $\bar{x} = 3.0$ , range 0-6), followed by substitution ( $n = 58$ ,  $\bar{x} = 2.64$ , range 0-9). Insertion errors were ranked third for the D group ( $n = 101$ ,  $\bar{x} = 4.59$ , range 0-9) and fourth for the C group ( $n = 34$ ,  $\bar{x} = 1.55$ , range 0-9), while spelling errors were fourth for D ( $n = 54$ ,  $\bar{x} = 2.45$ , range 0-8) and third for C ( $n = 41$ ,  $\bar{x} = 1.86$ , range 0-5). Transposition was ranked fifth for both groups (D,

$n = 31$ ,  $\chi = 1.41$ , range 0-4; versus C,  $n = 11$ ,  $\chi = .50$ , range 0-4). Whole word errors were the least common in both groups. All differences in the frequencies of error types were significant at the .01 level, with the exception of spelling errors (SUB  $\chi^2 = 82.96$ ; DEL  $\chi^2 = 12.8$ ; INS  $\chi^2 = 33.26$ ; and TRANS  $\chi^2 = 9.52$ , but SPEL  $\chi^2 = 1.78$ ,  $p < 0.20$ ).

**Table 1**  
*Spelling performance on pseudo-words*

|                                  | Group | Developmental   | College-level   |
|----------------------------------|-------|-----------------|-----------------|
| Total # Correct (%)              |       | 118/440 (26.8%) | 260/440 (59.1%) |
|                                  | Mean  | 5.36/20         | 11.82/20        |
|                                  | Range | 0-14            | 4-17            |
| Total words with single error    |       | 156             | 150             |
|                                  | Mean  | 7.09            | 6.82            |
|                                  | Range | 0-11            | 3-10            |
| Total words with multiple errors |       | 154             | 32              |
|                                  | Mean  | 7.00            | 1.45            |
|                                  | Range | 0-17            | 0-7             |
| Total whole word errors          |       | 7               | 2               |
|                                  | Mean  | .30             | .09             |
|                                  | Range | 0-4             | 0-2             |

**Table 2**  
*Error types in misspelled pseudo-words*

| Error Type | Total |    | Mean |      | Range |     |
|------------|-------|----|------|------|-------|-----|
|            | D     | C  | D    | C    | D     | C   |
| SUB        | 206   | 58 | 9.36 | 2.64 | 1-3   | 0-9 |
| DEL        | 114   | 66 | 5.18 | 3.00 | 1-12  | 0-6 |
| INS        | 101   | 34 | 4.59 | 1.55 | 0-9   | 0-9 |
| SPEL       | 54    | 41 | 2.45 | 1.86 | 0-8   | 0-5 |
| TRANS      | 31    | 11 | 1.41 | .50  | 0-4   | 0-4 |

*Note.* D = Developmental writing students. C = Students taking college-level courses. SUB = substitution, DEL = deletion, INS = insertion, SPEL = spelling, TRANS = transposition.

The percentage of total errors that each error type represents also suggests that the underlying processes involved in this phonological decoding-orthographic re-coding task are differentially challenged in the two groups (Table 3). The rate of substitution errors made by the D group was nearly 1.5 times the rate of the C group (40.1% versus 27.4%). In other words, subjects in the D group made 40% of their errors by either mishearing or misrepresenting a sound. On the other hand, deletion errors constituted a greater proportion of the errors made by the C group (D = 22.2%; C = 31.1%), as did pure misspellings (D = 10.5%; C = 19.3%). Insertion, transposition, and whole word errors were all present in higher proportions in the D group.

*Table 3*  
*Error rate for misspellings of pseudo-words*

| Error type as percentage of total errors | Developmental | College-Level |
|--|---------------|---------------|
| SUB                                      | 40.1          | 27.4          |
| DEL                                      | 22.2          | 31.1          |
| INS                                      | 19.7          | 16.0          |
| SPEL                                     | 10.5          | 19.3          |
| TRANS                                    | 6.0           | 5.2           |
| WHOLE WORD                               | 1.9           | .1            |

*Note.* SUB = substitution, DEL = deletion, INS = insertion, SPEL = spelling, TRANS = transposition.

A closer examination of the substitution errors made by both groups reveals that although both sets of students had more difficulty perceiving and/or representing the vowel phonemes than the consonant phonemes, the D group was worse in this regard than the C group (Table 4). The ratio of vowel-to-consonant substitution errors was .92 for the D group and .62 for the C group. The type of vowel error was also different, in that 35% of the vowel errors made by the D group were confusion of monophthongs, single-sound vowels such as the *i* in *bit*, and diphthongs, double-sound vowels such as the *oy* in *boy*. That is, a subject used a letter typically representational of a monophthong to represent a diphthong, or vice versa (for example, *sclange* for [sklaundz]). In contrast, such confusion marked only 17% of the vowel errors for the C group. For consonants, on the other hand, both groups most commonly made substitution errors involving place of articulation (58% D, 54% C). Subjects often made errors consisting of a combination of feature substitutions, as well. For

the D group, vowel substitution error combinations most commonly included errors of height (32%), and for the C group both height errors and tongue advancement errors were equally involved (27.7%). For consonants exhibiting multiple feature substitution errors, errors of place of articulation were present in 100% of the combination errors made by the D group; the C group made place and manner articulation substitutions equally often in their consonant substitution error combinations (44.4%). For instance, the representation of the sound /k/ as the letter *s* indicates an error of perception or representation of both place and manner; the representation of /i/ with the letter *o* shows height, advancement, and rounding features perceived or represented incorrectly. Of course, it is not possible to say, for the substitutions which seem especially random, which systems—phonological, orthographic, or other—are failing to operate.

**Table 4**  
*Types of substitution errors*

| Error                                    | Developmental | College Level |
|--|---------------|---------------|
| Vowel to consonant substitutions (Ratio) | .92           | .62           |
| Vowel substitution types (%)             |               |               |
| Diphthong/monophthong                    | 35            | 17            |
| Height                                   | 33            | 26            |
| Tongue advancement                       | 2             | 12            |
| Tense/lax                                | 0             | 4             |
| Combined feature substitutions (%)       | 27            | 39            |
| Includes height                          | 32            | 27.7          |
| Includes tongue advancement              | 22.7          | 27.7          |
| Includes tense/lax                       | 22.7          | 22.2          |
| Includes rounding                        | 22.7          | 22.2          |
| Consonant substitution types (%)         |               |               |
| Place                                    | 58            | 54            |
| Voicing                                  | 19            | 16            |
| Manner                                   | 8             | 19            |
| Combined feature substitutions (%)       |               |               |
| Place                                    | 100           | 44.4          |
| Manner                                   | 75            | 44.4          |
| Voicing                                  | 5             | 11.1          |

## Discussion

Perhaps the most surprising result is not that the D students made so many spelling errors, but that the C students made as many as they did. No subject spelled more than 17 of 20 words correctly, and only four of the 22 students performed this well. The average percentage of spellings considered correct was only 59% for the C group, a score which on most tests would be below passing. The average score in the D group was about 27%. Given the poor performance of both groups, one must wonder whether the sample of subjects is representative of most college-level students, whether poor spelling skills might be linked to this particular generation of students, or whether some other explanation is likely.

Many students who are required to take developmental writing have not demonstrated mastery of Standard English. African American students made up a disproportionate number, 40%, of the developmental students in this study. The C group included only one African American student. Although this student had not been required to take the developmental writing course, she consistently struggled throughout the semester with the linguistics material and also achieved the lowest score in the C group (4/20). She made 9 single and 7 multiple errors, dominated by 9 insertions, 7 substitutions, and 5 deletions. Although the under-performing African American students likely represented a general level of inadequate preparation which also presented itself in other students who performed poorly, a non-standard dialect might result in differences in phonological or orthographic coding. When students in linguistics classes are learning phonetic transcription, for example, it is often the case that they transcribe their own pronunciation of a word rather than the model pronounced by the instructor. Thus, students from the lower Midwest sometimes perceive the word *pen* as *pin* because of the vowel-raising rule in their dialect. Perception of the nonsense words could therefore have been colored by dialectal variation.

Given the disproportionate number of women in the group, it is also possible that performance is influenced by gender. A comparison of the performance of men and women from both groups showed that women did have better spelling skills, averaging 10.35/20 correct versus 6.4/20 for the men. In all, men spelled 116 words correctly, and women 269 ( $\chi^2 = 27.92, p < 0.01$ ).

A third explanation is that the particular generation of students represented by most of these subjects is somehow less adept at spelling than other generations, or that this generation in this particular locale has for some reason not acquired the expected level of spelling skills. Some evidence exists for this possibility, the strongest being that all the

students, even those in the C group, performed relatively poorly. Why this might be the case is subject to conjecture. One possibility is that a majority of these students were in the early primary grades about the same time that many school systems in the country adopted an approach to reading where phonologically based reading and spelling strategies were less explicitly taught. It is possible that this may have played a role in their performance on this task.

It is also the case that the university where these data were collected has fairly low admissions standards. If there is a correlation between academic performance and reading ability, and if the latter can be measured in part by skill in spelling unfamiliar words, then this subject sample may represent only the performance of a subset of college students, namely, those not academically competitive enough to enter more selective colleges. Some of the students in the C group were academically strong, and they tended to score well on the task. Among the controls, for example, were four high school honors students attending a university-level course. These four, all of whom were female, averaged 13.25 words correct (range: 9-17), and the errors that were made were, in all cases but one, single-error misspellings. Clearly, these four were among the better performers. An academic exercise of pseudoword spelling may have favored students such as these, who are practiced in the performance on school-like tasks. In contrast, developmental writers likely have much less practice with formal written language.

Another explanation for the results, however, is that both groups included subjects with reading or other language-based learning disabilities which had never been diagnosed. This possibility is not often considered for students who have been admitted to college.

Among the lowest performers were three students who had been formally diagnosed with a disability. These students showed similar patterns of spelling errors. Only one student in the C group reported any disability, in this case a reading delay caused by difficulty in saccadic function, the rapid shift of eye gaze from one point to another that occurs in reading and certain other visual tasks. This student was by no means the poorest performer, although she performed below average with a score of 7 of 20 words spelled correctly. Nine of her words contained single errors and four multiple errors, with substitution the most frequent problem, followed by deletion, then spelling.

In the D group, two students reported having a diagnosed disability. One student had been staffed as a special education pupil in public school with a diagnosis of dyslexia (subcategory unknown). He had been "zeroed out" of special education by his senior year, however, and again, he was by no means the worst performer. He spelled 6 of 20 words cor-

rectly, with 8 single and 6 multiple errors; the majority of errors were substitutions, followed by insertions. In his case, the insertions tended to be morphologically based, as he added suffixes such as *-ed* and *-es*. This is evidence of the remediation he had previously received to try to invoke known spelling patterns. The second disabled student was classified with attention deficit/hyperactivity disorder (ADHD). He had never been diagnosed with a reading disability, but the errors he routinely made in his class writing assignments were typical of dyslexia rather than ADHD. Despite urgings from the instructor that he request an evaluation for a reading disability, he resisted. He was one of the worst performers, with a score of 1 out of 20 correct. Six words contained a single error, but eleven contained multiple errors, including several with three or more errors. Two attempts were scored as "whole word" errors because they in no way resembled the target. The majority of errors were deletions, followed by substitutions.

The performance of the three students who had been formally diagnosed with some disability may partially explain the relatively poor performance of both groups. However, it is possible that undiagnosed language learning disabilities are impairing performance for other students as well. Linguistics courses no less than writing courses rely on language-related skills, and the poorest performers in the C group (those performing below the mean in number correct) were those students who were also academically unsuccessful, or only marginally successful (repeatedly receiving grades of C- or lower).

Richardson (1984) reported that learning disabled (LD) students, when matched for I.Q. and reading level with younger non-LD children, were especially poor at decoding "phonetically regular and nonsense (i.e., synthetic) words.... [These] LD children made significantly more vowel errors which could be characterized as random guesses than did younger normal readers" (p. 98). Schneider, Phillips, and Ganschow found that LD college students, when asked what accommodations they most wished their teachers to make for them, put allowances for poor spelling high on their lists, so they clearly recognize spelling as a problematic area (as cited in Ganschow, Phillips, & Schneider, 2001). The ratio of vowel to consonant substitution errors for the two groups indicates that the D group, especially, found perception and/or representation of the vowels to be troublesome. This lends further support to the hypothesis that developmental college students may have undiagnosed language learning disabilities.

If a sizable number of college students are placed in developmental writing classes because of undiagnosed language learning disabilities, then they should not be expected to make much improvement in their

writing skills as long as the underlying difficulties are not being targeted. The D students in this study received fairly standard instruction in organization, paragraph development, sentence structure, and punctuation. Only a minimal amount of instruction concerned spelling, and this was essentially a brief review of some of the most common spelling rules. It did not focus on phonological analysis of words, sound-letter correspondence skills, or on morphological analysis of any sort. Data from six of the D students who took a nonsense word spelling test twice—one early in the semester, and a different one at the end of the semester—indicate that the course did not necessarily improve spelling scores. Three of the students made fewer spelling errors in the second test, but two actually got worse, and one stayed the same.

## Conclusion

As colleges try to educate increasing numbers of students with smaller amounts of revenue, it is essential to direct instructional resources to where they can be most effective. While there are clearly students who are not intellectually capable of university-level work and the abstract levels of thought it often requires, others may have the intellectual capacity, but be ill prepared in some cases, or have language learning disabilities, or both. It is these students who often populate the developmental writing courses which, however, may not focus on the underlying problems. The data presented here suggest that many college students, both developmental and otherwise, may exhibit deficiencies in phonological-orthographic skills. These deficiencies may be based in perception, in phonological representation, or in orthographic knowledge, which can impair a student's ability to read and comprehend the material required, and to successfully respond in writing, at the level expected of a college student.

Treatment of such deficiencies has been successful in clinical settings. Dietrich (1994), using a modification of Lindamood and Lindamood's "Auditory Discrimination in Depth" program, was able to teach phonological skills to poor readers in community college. Apel and Swank (1999) reported successful intervention with a college-age student whose reading level and especially word attack and word identification skills were well below average. By targeting phonological awareness, visual-orthographic images (i.e., mental images of the graphic form of syllables, morphemes, and words), morphological awareness, and problems of self-concept, they substantially improved the student's reading abilities within a semester's time. Although this student required additional development of reading and especially decoding skills, and the students in the present study were deficient in spelling, similar processes underlie

both the decoding of unfamiliar words and the attempt to spell them. Given the success that clinical intervention has had in increasing reading speed and ability, adapting such methods for use in courses designed to develop delayed writing skills may more effectively give developmental students the assistance they need to have a realistic chance of success in college. The inclusion of testing and instruction in phonological coding and spelling might provide effective support for those students placed in the developmental writing classroom because of underdeveloped phonological awareness skills.

Although further research involving a greater variety of adult populations would be beneficial, students are pouring into the classrooms now, requiring immediate help. A nonsense-word spelling test is a quick and efficient way to identify those students who may benefit from specific instruction to develop phonological and orthographic skills as part of education and development efforts.

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## Appendix

### Sample pseudo-words (phonetic representations)<sup>1</sup>

|           |           |          |          |
|-----------|-----------|----------|----------|
| [smunts]  | [snoigzd] | [strebd] | [splorč] |
| [sprlmp]  | [sklænč]  | [branks] | [tranz]  |
| [trupst]  | [spukst]  | [splogz] | [skrīnō] |
| [sklaunj] | [strelj]  | [twolšt] | [plimst] |
| [drɔks]   | [klusps]  | [skræfs] | [sprabz] |

<sup>1</sup> These words are rendered as the author pronounced them, but their source is Swanson 1996, who writes them orthographically.

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